DOCUMENT MODIFICATION REQUEST (DMR)

Refer to 1-A01-PPG-001 for Processing Instructions.
Print or Type All Information (Except Signatures)

1. Date 7/19/94	25. DMR. No. 94-DMR- 001521
2. Existing Document Number/Revision 5-21000-OPS GT.9, Rev. 2	3. New Document Number or Document Number if it is to be changed with this Revision N/A
4. Originator's Name/Phone/Page/Location G. Anderson/8504/4013/080	5. Document Title Soil Gas Sampling and Field Analysis
6. Document Type ☒ Procedure ☐ Other ____	7. Document Modification Type (Check only one) ☐ New ☐ Revision ☐ Intent Change ☒ Nonintent Change ☐ Editorial Correction ☐ Cancellation

8. Item	9. Page	10. Step	11. Proposed Modifications
1	14	5.3.1	Add the following sentence to the end of the identified section: For the soil gas surveys in OUs 8, 10, 12, 13, and 14, the procedures for sampling of soil gas and on-site volatile organic compounds analysis by the modified EPA Method 524.2 is presented in Appendix GT.9B as a reference.
2	18	5.3.1.3	Add the following sentence to the end of the last paragraph of the identified section: For the soil gas surveys in OUs 8, 10, 12, 13, and 14, the procedures for sampling of soil gas and on-site volatile organic compounds analysis by the modified EPA Method 524.2 is presented in Appendix GT.9B as a reference.
3	~~A-2~~ B-1	Appendix	Add the following two SOPs to GT.9, Rev. 2 as Appendix GT.9B: 1) Walsh Standard Operating Procedures For Obtaining Soil Gas And Soil Samples, 2) Volatile Organic Compound Analysis Of Air And Soil Gas Samples By Thermal Desorption And Gas Chromatography/Mass Spectrometry.

12. Justification (Reason for Modification, EJO#, TP#, etc.)

Clarification of soil gas procedures for Industrial Area Operable Unit work

If modification is for a new procedure or a revision, list concurring disciplines in Block 13, and enter N/A in Blocks 14 and 15. If modification is for any type of change or a cancellation, organizations are listed in Block 13, then Concurror prints, and signs in Block 14, and dates in Block 15.

13. Organization	14. Print and Sign (if applicable)	15. Date (if applicable)
EOM	Marla Broussard [signature]	8/23/94
~~IA/OU~~	~~Bruce Peterman~~	
EQS	Charlie Hayes [signature]	8/10/94
QAPM	R S LUKER [signature]	8.23.94

16. Originator's Supervisor (print/sign/date) T. BRUCE D. Peterman [signature] 8/23/94

17. Assigned SME/Phone/Page/Location	18. Cost Center	19. Charge Number	20. Requested Completion Date	21. Effective Date
GREGG A. ANDERSON [signature] 8/10/94	0243	989252		9/2/94

22. Accelerated Review? Yes ~~No~~ No ☒
23. ORC Review NOT REQUIRED
24. Responsible Manager (print, sign, date) GREGG A. ANDERSON [signature] 8/8/94

REVIEWED FOR CLASSIFICATION/UCNI
BY NA
DATE NA

ADMIN RECORD

DOCUMENT CLASSIFICATION REVIEW WAIVER
PER R.B. HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991

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A-SW-002305

DOCUMENT MODIFICATION REQUEST (DMR)

Refer to 1-A01-PPG-001 for Processing Instructions.
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1. Date	25. DMR No.
1/31/95	2-27-95 lmm 95-DMR-D00107

2. Existing Document Number/Revision	3. New Document Number or Document Number if it is to be changed with this Revision
5-21000-OPS-GT.9/Rev. 2	N/A

4. Originator's Name/Phone/Pager/Location	5. Document Title
N. Elzinga/740-2740/WCFS Denver	Soil Gas Sampling and Field Analysis

6. Document Type: ☒ Procedure ☐ Other _____

7. Document Modification Type (Check only one): ☐ New ☐ Revision ☐ Intent Change ☒ Nonintent Change ☐ Editorial Correction ☐ Cancellation

8. Item	9. Page	10. Step	11. Proposed Modifications
1	12	5.3	At the end of the last paragraph on this page, add "For the OU-2 Trenches and Mound Site Characterization Program, soil gas probes will be located 20 feet apart and identified VOC high concentration areas will be further delineated with additional soil gas probe locations."
2	14	5.3.1	Between the first and second paragraphs on this page, add a new paragraph: "For the OU-2 Trenches and Mound Site Characterization Program, volatile organic compounds will be analyzed on-site utilizing EPA Method 8010."
3	14	5.3.1.1	At the end of the first sentence of paragraph #1, add: "For the OU-2 Trenches and Mound Site Characterization, the soil gas sample locations will be purged using a development syringe. Three probe volumes will be removed."

12. Justification (Reason for Modification, EJO #, TP #, etc.)

1. The 20 feet spacing is appropriate because most of the trenches are less than 50 feet wide and the objective is to identify VOC high concentration areas.
2. This EPA method will provide data consistent with the project objectives.
3. & 4. This alternative method for purging probe locations will provide a cost savings.

OU 2 Temporary Limited Scope Expires July 31, 1995

If modification is for a new procedure or a revision, list concurring disciplines in Block 13, and enter N/A in Blocks 14 and 15. If modification is for any type of change or a cancellation, organizations are listed in Block 13, then Concurror prints, and signs in Block 14, and dates in Block 15.

13. Organization	14. Print, Sign (if applicable)	15. Date (if applicable)
SME	Robert G. Smith	2-27-95
Proj. Mgr.	P. J. Laurin	2-23-95
QA	R. Stephen Luker	2.21.95

16. Originator's Supervisor (print/sign/date): Peter J. Laurin

17. Assigned SME/Phone/Pager/Location	18. Cost Center	19. Charge Number	20. Requested Completion Date	21. Effective Date
Robert G. Smith/8705/5135/080	3112	989214		02-28-95

22. Accelerated Review?	23. ORC Review
Yes ☐ No ☒	N/A

24. Responsible Manager (print,sign,date): Peter J. Laurin

RF-47940 (5/93)

REVIEWED FOR CLASSIFICATION / UCNI
BY _____
DATE _____

DMR (continuation sheet)

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25. DMR No. ~~2-27-95 kmw~~ 95-DMR-00107

2. or 3. Document Number/Revision	5. Document Title
5-21000-OPS-GT.9/Rev. 2	Soil Gas Sampling and Field Analysis

8. Item	9. Page	10. Step	11. Proposed Modifications
4	18	5.3.1.3	At the end of the first sentence, add: "For the OU-2 Trenches and Mound Site Characterization Program, soil gas samples will be collected by a syringe and transferred to decontaminated reusable glass sample container."

12. Justification (Reason for Modification)

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LIST OF EFFECTIVE PAGES

Pages	Effective Date	Change Number
2, 14, 18, B-2	09/02/94	94-DMR-001521
8, 10, 26	04/11/94	94-DMR-000431
12, 14, 18	02/28/95	95-DMR-000107

TOTAL NUMBER OF PAGES: 27 (not including Appendices)

5.3 IN SITU SOIL GAS SAMPLING

In situ soil gas sampling is performed by pulling air samples with a vacuum pump directly through a hollow probe in the ground. Analysis of samples can be accomplished by multiple methods. This technique allows for the identification and quantification of specific volatile organic compounds.

In situ soil gas samples can be collected by dynamic or passive methods. Dynamic soil gas sampling involves extracting a volume of soil gas from the ground and analyzing the sample. A hollow steel rod is driven into the ground, and the soil gas sample is withdrawn with a vacuum extraction pump. The major advantages of dynamic soil gas testing are rapid data availability and the ability to distinguish between soil and groundwater contamination sources by vertical soil gas profiling.

Passive soil gas sampling generally involves implanting adsorption devices in the shallow surface soil and allowing them to adsorb VOC vapors from the soil for a period of days or weeks. After exposure, the devices are dug out and sent to a laboratory for analysis. This sampling methodology is probably the least expensive, but requires a considerable amount of time, and is less versatile than dynamic sampling methods.

Pertinent site-specific and compound-specific factors which influence the collection and interpretation of soil gas are required to be identified and evaluated in order to develop a comprehensive sampling program.

Sampling along an established grid is recommended at sites where the source(s) or general orientation of a subsurface plume are unknown. Where data are available which identify the source areas or plume characteristics, delineation of contaminant edges is most effectively achieved by establishing a transect parallel to the direction of groundwater flow and sampling outward from the suspected source. Soil gas probes should not be located less than 50 feet apart because the resolution of most soil gas detection techniques can be exceeded. For the OU-2 Trenches and Mound Site Characterization Program, soil gas probes will be located 20 feet apart and identified VOC high concentration areas will be further delineated with additional soil gas probe locations.

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equipment. These techniques require the installation of a probe or soil boring in the vadose zone of a soil followed by withdrawal of the soil gas by a vacuum pump. Soil gas samples may be collected in gas sample bags, syringes, or on adsorption media. Samples collected in gas sample bags or on adsorption media must be analyzed at a nearby or on-site laboratory due to short sample holding times. Syringe samples must be analyzed on location immediately after collection.

For the OU-2 Trenches and Mound Site Characterization Program, volatile organic compounds will be analyzed on-site utilizing EPA Method 8010.

A procedure for sampling of soil gas and on-site volatile organic compounds analysis by the modified EPA Method 502.2 is presented in Appendix GT.9A as a reference. For the soil gas survey in OUs 8, 10, 12, 13, and 14, the procedure for sampling of soil gas and on-site volatile organic compounds analysis by the modified EPA Method 524.2 is presented in Appendix GT.9B as a reference.

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5.3.1.1 Soil Gas Probe Installation

Dynamic or grab sampling techniques require the installation of a probe in the vadose zone of a soil followed by withdrawal of the soil gas by a vacuum extraction pump. For the OU-2 Trenches and Mound Site Characterization, the soil gas sample locations will be purged using a development syringe. Three probe volumes will be removed. The probes are usually constructed of 1/4 to 1 inch diameter steel pipe and are equipped with perforations near the tip, or with a detachable drive point. Soil gas probes must be cleaned with steam or hot water and soap before use (see SOP FO.3, General Equipment Decontamination). A sufficient number of interchangeable sampling components should be available so that decontamination does not need to be performed in the field.

Multiple soil gas sampling intervals may be sampled at one location in order to identify contaminant profiles. The soil gas sampling can also be performed in augured boreholes or through the center of hollow-stem augers by driving the probe at least 2 feet deeper than the augured depth.

Required Equipment and Apparatus

- Soil gas probe(s), tips (if needed), and drive pipe(s)

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5.3.1.3 Sample Collection for Laboratory Analysis

Sampling/analysis of grab samples may also be accomplished by pumping the soil gas from the probe and collecting the gas in a Tedlar bag. Alternatively, the soil gas may be pumped through a charcoal or Tenax trap. The VOCs in the soil gas are adsorbed onto the charcoal or Tenax. These samples must then be analyzed at an on-site laboratory since the holding times for these collection methods are short (1 to 8 hours). Analytical methods typically include the use of gas chromatography (GC) and/or mass spectrometry (MS). For the OU-2 Trenches and Mound Site Characterization Program, soil gas samples will be collected by a syringe and transferred to a decontaminated reusable glass sample container.

Specific analytical methods and calibration procedures, standards concentrations, detectors, temperature programs, etc. are dependent on the method of analysis and analytes of interest. Specific analytical methods and procedures will be detailed in applicable project work plans. For the soil gas surveys in OUs 8, 10, 12, 13, and 14, the procedures for sampling of soil gas and on-site volatile organic compounds analysis by the modified EPA Method 524.2 is presented in Appendix GT.9B as a reference.

Required Equipment and Apparatus

- Gas collection bags such as Tedlar, carbon sorption, or Tenax sample tubes with accessory tubing (if required)
- Low-flow air sampling pumps, such as Gillian (if required)
- Adapter for the soil gas probe with appropriate tubing
- Vacuum pump to extract soil gas

Collection and Analysis Procedures

1. Run the vacuum pump to purge the system and displace the ambient air in the soil gas probe, drive pipe(s), and tubing. Attach a Tedlar bag and unclamp the flexible